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ABSTRACT

A category system for organizing six thinking skills and methods for teaching these skills, using the concept of time, are provided. Representing a proposed sequential order of development, the six thinking skills are: (1) imaging--the creating of an internal mental representation of an external thing and the labeling of that representation, (2) dissection--scanning and taking note of the qualities of an object, (3) conceptualization--sorting objects into classes on the basis of common characteristics, (4) definition--identifying structural composition or the relationship of parts to a whole, (5) relational analysis--recognizing an event as part of a sequence and (6) analogy--conceptualizing relationships and becoming aware of parallels in discretely different relationships. Ten demonstration activities matched to these various thinking skills are presented for elementary social studies students. The concept of time is introduced in various ways, including student imaging of time spent at various activities during the day, dissection or noting events related to previous birthdays, conceptualization of a timeline, and definition or identification of relationships inferred from a timeline. A timeline of events in history, list of life spans of famous people in history (980 A.D. to 1980), a worksheet, and teacher's guide are provided for the final relational analysis activity. Alternative approaches and follow-up activities are included. (LH)

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TEACHING THINKING SKILLS USING THE CONCEPT TIME

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Learning can take place with or without a teacher or formal instruction. One of the assumptions upon which schools are based, however, is the notion that teachers can facilitate the learning process, either through live instruction or through media. The historical experience of cultures tends to support this assumption that teaching facilitates learning. Some research literature even provides support for the notion that particular kinds of learning may be dependent upon form instruction. This would seem to be the case with learning to think categorically (Luria, 1976), a foundation for formal concept learning.

If the foundation for formal concept learning must be learned, then teachers would be derelict if they failed to make deliberate efforts to teach basic thinking skills. The following materials outline a category system for organizing six hypothesized thinking skills; and provide illustrations of methods for teaching these skills with the concept time.

The thinking skills which follow represent a proposed sequential order of the development of thinking. The first skill, imaging, is largely a perceptual skill, that of mental representation of an image. The image represented might have a direct correspondence to some visual object in the real world (a dog, a house, an automobile) or it might be a visual model of something abstract (the circular flow model of economic activity, a graph of GNP plotted across time, a planetary model of an atom, a periodic chart of the elements). In either case the mental representation is visual-spatial rather than verbal-analytic, and provides a basis for further thought about the phenomena in question.

The second skill, dissection, is perceptually analytic in that the learner deliberately scans the visual-spatial image in order to take note of the qualities of the image. This skill is the skill identified by Downey (1980) in his discussion of the instructional use of pictures in

in history textbooks. This skill also underlies ability to pick up distortions in graphs, such as a false zero point, or in a map, such as a longitudinal spreading at higher latitudes.

The third skill, conceptualization, draws upon the dissection skill in that taking note of the qualities of a visual image provides the basis for sorting images into classes in terms of common features. Critical to this skill is the ability to attend to the features that are shared by other examples in the same class, while avoiding distraction by the features idiosyncratic to particular examples.

The fourth skill, definition, is again perceptually analytic, requiring the learner to look for relationships between parts of the conceptualized image, so as to apprehend the structure of the thing represented. An essential element of the skill, however, is the expression of the relationships in words. This skill anticipates the use of the knowledge of the thing in that the relational structure of the thing provides clues to its function. Verbalizing the relationships gives form to the structural relationships.

The fifth skills, relational analysis, requires students to focus on the external relationship between the thing represented and other conceptual phenomena. In one sense relational analysis serves as a half-way house on the way to the creation of a new image on a higher plane of abstraction. When the relationship between the thing represented and other conceptual phenomena is expressed in words it forms a proposition which may give birth to a new visual model. That process (the formation of a new visual model) occurs through the agency of analogy, where the relationship is intuitively seen as comparable to some other visual model already imaged.

The sixth, skill, analogy, is a kind of lateral thinking in which a pattern or relationship identified through relational analysis, above, is used as a blue print for the apprehnsion of similar relationships in other

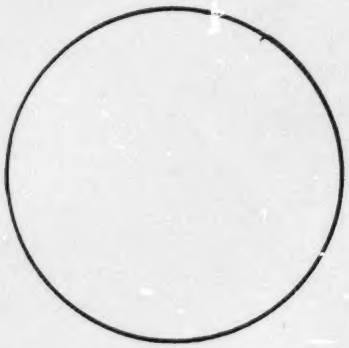
phenomena. The skill of analogy probably cannot be taught directly. Rather, analogy emerges if the conditions for analogous thinking are satisfied. Those conditions include a requirement that the knowledge acquired is comprehended in the context of the critical attributes which structure the concept. A common place illustration of this process would be the use of the model of the solar system as an analogy for understanding and imaging the structure of an atom.

Teachers can plan instructional sequences on the basis of the order of thinking skills represented by the category system. The demonstration activities using the concept time found on pages 5 and 6 illustrate how the instruction can be matched to the various thinking skills.

IMAGING	The creation of an internal mental representation of an external thing and the labeling of that representation.
DISSECTION	The process of scanning something so as to take note of the qualities of the object.
CONCEPTUALIZATION	The process of sorting objects into classes on the basis of some common characteristics.
DEFINITION	The mental process of identifying the structur al composition of a thing, or the relationship of parts to a whole.
RELATIONAL ANALYSIS	The mental process of recognizing an event or operation as part of a sequence; and awareness of discrete points in the sequence.
ANALOGY	The mental process of conceptualizing relationships so that one becomes aware of parallels in discretely different relationships.

DEMONSTRATION ACTIVITIES FOR TEACHING THINKING SKILLS WITH USE OF TIME AS THE CONCEPT--ELEMENTARY SOCIAL STUDIES

Imaging



Have the students construct a Pie of Life. Ask each student to draw a large circle which represents a typical day in their life. First, look at how many hours there are in a typical day (24 hours). Have students estimate how many hours they spend on each of the following areas on a typical school day:

1. Sleep
2. School
3. Chores
4. Work or jobs that earn money
5. Homework
6. Alone, playing reading watching TV
7. Friends
8. Family
9. Miscellaneous

Dissection

Next, ask each student to think back to their last birthday. Ask each student to write a short story telling what they received for their last birthday and what personal events have occurred during this past year. Then, ask: How many birthdays can you remember from the time your were born? Take each successive birthday remembered and have the students describe the major personal events they can remember. Point out the fact that the further back one goes into their life the harder it is to remember.

Conceptualization

Have the students indicate on the time line (see page four) when they were born by circling that date on the time line. Next, have the students place the major personal events that they have described earlier on this time line. Provide students with an exhaustive list of major political events and during the past twenty years and tell them to include only those events they can actually remember having happened on the (see page four) time line.

Definition

Study the time line so as to identify the span of years in terms of student's age (6-12 years old) and take that increment and compare their life span to what occurred each of the last 6-12 years in American History or World History for the past century and then back to 1770. See pages four and five.

DEMONSTRATION ACTIVITIES FOR TEACHING THINKING
SKILLS WITH THE USE OF THE TIME CONCEPT

IMAGING — Have students draw a time line from when they were born to the present and locate major historical events along that line. Provide the students with an exhaustive list of events during the past 20 years and tell them to include on their time line only those events they can remember having happened.

DISSECTION — Study the time line so as to identify the time spans between the two events you remember most vividly.

CONCEPTUALIZATION — Take the time span between the events you remember most vividly and match that time span with five different equivalent time spans in American or World History. You will need to provide students with an exhaustive list of events in either American or World History.

alternative — Mark off time from the present to the American Revolution in time spans equivalent to the time span used above. Do the same for other events in American History, determining how far in the past these events occurred in terms of the time span rather than in terms of years.

DEFINITION — Identify your parent's life span and find a historical event which occurred at about the time that he/she was born. Then identify major historical events which occurred during the parent's life span and determine how old the parent was when these events occurred. Have the students interview their parent (s) and find out what their parent (s) thought of those events when they occurred.

RELATIONAL ANALYSIS — Provide students with a long list of prominent historical figures (see attachment) which were significant in American History between 1492 and the present. Then ask students to assemble a list of sequential lives which link Columbus to the present. Since it would be difficult if not impossible to find historical figures whose birthdates match other historical figures' death dates, allow an overlap either way of 15 years. Have student identify for each of their historical figures their ages at the times of the major historical events in their lives; and events which occurred approximately the same time as their 16th birthdays. Have student speculate about whether these historical figures could have anticipated the major events which they influenced. Finally, have students speculate about what potential events might lie ahead in their lives.

1950 Korean War began

1952 Eisenhower Elected President

1954 Brown vs. Board of Education

1956 Suez Crisis

1957 Sputnik launched by U.S.S.R.

1958 U.S. launched Explorer I

1960 Kennedy Elected President

1961 Berlin Wall; First U.S. Astronaut in Space

1962 Cuban Missile Crisis

1963 Kennedy Assassination; Johnson President

1964 Gulf of Tonkin Resolution; U.S. Involvement in Vietnam; Johnson Elected President

1966 National Organization of Women

1968 Nixon Elected President

1969 U.S. Astronauts Land on Moon;

1970 Kent State Disaster

1972 Nixon Re-Elected; Watergate Investigation Begins

1973 Agnew Resigned; Ford Appointed Vice President

1974 Nixon Resigned; Ford Became President

1976 Carter Elected President

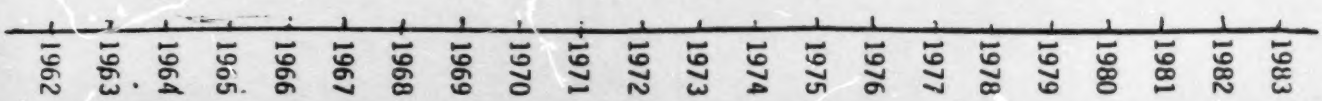
1978 Camp David Accords on the Middle East

1979 Iranian Hostage Crisis Begins

1980 Reagan Elected President

1982 Lebanon Crisis

1983 Korean Airliner Downed



[illegible]S IN AMERICAN HISTORY

1764	Enforcement of Navigation Acts
1765	Stamp Act and Quartering Act
1766	Repeal of Stamp Act
1767	Townsend Acts
1770	Boston Massacre
1773	Committees of Correspondence; Boston Tea Party
1774	First Continental Congress
1775	Lexington and Concord; Bunker Hill
1776	Declaration of Independence
1777	Saratoga
1781	Cowpens; Yorktown
1787	Northwest Ordinance; Constitutional Convention
1789	Washington Elected President
1791-3	Bill of Rights ratified; Cotton Gin
1796	Adams Elected President
1800	Jefferson Elected President
1803	Louisiana Purchase
1806	Lewis and Clark complete expedition
1807	Embargo Act; Fulton's Steam Boat
1808	Madison Elected President
1812	War of 1812
1816	Monroe Elected President
1820	Compromise of 1820
1823	Monroe Doctrine
1824	John Quincy Adams Elected President
1828	Tariff of Abominations; Jackson Elected President; B. & O. Railroad
1830	Indian Removal Act; Steel Plow
1834	Mechanical Reaper; National Trades Union
1837	Morse designs Telegraph
1839	Vulcanization of Rubber
1846	Sewing Machine; Mexican War
1848	First Women's Rights Convention; California Gold Rush
1850	Compromise of 1850
1854	Kansas-Nebraska Act
1857	Dred Scott Decision
1859	John Brown's Raid
1860	Lincoln Elected President; South Carolina Secedes from the Union
1861	Confederacy Formed; Attack on Fort Sumter
1862	Emancipation Proclamation
1863	Gettysburg
1865	Lee Surrenders; Lincoln Assassinated; 13th Amendment Ratified
1867	Reconstruction Acts
1869	Knights of Labor Organized
1868	14th Amendment Ratified
1869	First Transcontinental Railroad
1881	Garfield Assassinated
1882	Chinese Exclusion Act
1890	National American Women Suffrage Assoc.
1896	Plessy v. Ferguson
1898	Spanish-American War
1901	McKinley's Assassination
1904	T. Roosevelt Elected President
1909	NAACP Organized
1914	Panama Canal Completed
1916	Woodrow Wilson Re-Elected
1917	U.S. Enters World War I
1918	Fourteen Points; Treaty of Versailles
1920	19th Amendment Ratified; Prohibition; First Radio Broadcast
1924	Immigration Act
1927	Lindbergh Flies the Atlantic
1928	Hoover Elected President
1929	Stock Market Crash
1932	Bonus Army March on Washington; F.D.R. Elected President
1933	New Deal Begins
1936	Good Neighbor Policy
1940	Selective Service Act
1941	Lend-Lease; Pearl Harbor
1942	Japanese-Americans Interned
1943	Allies Took North Africa; Movie "Casablanca"; Italy Surrende
1945	Yalta Conference; U.N. Established Germany Surrenders; Bombing of Hiroshima; Japan Surrenders
1947	Marshall Plan
1948	Truman Elected; Berlin Airlift.
1949	NATO Established
1950	Korean War Begins

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1000-1607

GROUP F

Lief Erikson	980?-1025?
Marco Polo	1254-1324?
Prince Henry the Navigator	1394-1460
John Cabot	1450?-1498
Christopher Columbus	1451-1506
Amerigo Vespucci	1454-1512
Bartholomew Diaz	1457?-1500
Vasco Da Gama	1469-1524
Ponce de Leon	1474-1521
Ferdinand Magellan	1480?-1521
Jacques Cartier	1491-1557
Sir Francis Drake	1540?-1596
Sir Walter Raleigh	1552?-1618
Samuel de Champlain	1567?-1635
Lord Baltimore (Calvert)	1580?-1632
Capt. John Smith	1580-1631
Thomas Hooker	1586-1647
John Winthrop	1588-1649
Ann Hutchinson	1591-1643
Pocahontas	1595?-1617
Roger Williams	1603-1683

1607-1750

GROUP E

Peter Stuyvesant	1610?-1672?
John Locke	1632-1704
Pierre Marquette	1637-1675
Robert LaSalle	1643-1687
Cotton Mather	1663-1728
James Ogelthorpe	1696-1785
Benjamin Franklin	1706-1790
Johann DeKalb	1721-1780
Samuel Adams	1722-1803
Edmund Burke	1729-1797
Francis Marion	1732?-1795
George Washington	1732-1799

William Penn 1644-1718

BEST COPY AVAILABLE

GROUP E

Daniel Boone	1734-1820
John Adams	1735-1826
Paul Revere	1735-1818
Patrick Henry	1736-1799
John Hancock	1737-1793
Thomas Paine	1737-1809
Thomas Jefferson	1743-1826
Abigail Adams	1744-1818
John Jay	1745-1829
John Paul Jones	1747-1792
Casimir Pulaski	1748-1779

1750-1800

GROUP D

James Madison	1751-1836
George Rogers Clark	1752-1818
John Marshall	1755-1835
Aaron Burr	1756-1836
Alexander Hamilton	1755 or 1757-1804
Marquis de Lafayette	1757-1834
Robert Fulton	1765-1815
Eli Whitney	1765-1825
Tecumseh	1765-1813
Andrew Jackson	1767-1845
John Quincy Adams	1767-1848
Henry Clay	1777-1852
Francis Scott Key	1779-1843
John C. Calhoun	1782-1850
Daniel Webster	1782-1852
John James Audubon	1785-1851
Sacajawea	1787?-1812
James Fenimore Cooper	1789-1851
Samuel F.B. Morse	1791-1872
Thaddeus Stevens	1792-1868
Stephen Austin	1793-1836
Sam Houston	1793-1863
Stephen Kearney	1794-1848
Cornelius Vanderbilt	1794-1877

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1800-1860

GROUP C

John Brown	1800-1859
Brigham Young	1801-1877
Dorothea Dix	1802-1887
Ralph Waldo Emerson	1803-1882
William Lloyd Garrison	1805-1879
Joseph Smith	1805-1844
Robert E. Lee	1807-1870
Jefferson Davis	1808-1889
Edgar Allen Poe	1809-1849
Cyrus McCormack	1809-1884
Abraham Lincoln	1809-1865
Charles Sumner	1811-1874
Horace Greeley	1811-1872
Harriet Beecher Stowe	1811-1896
John Fremont	1813-1890
Stephen Douglas	1813-1861
Edwin Stanton	1814-1869
Frederick Douglas	1817-1895
Henry David Thoreau	1817-1862
Susan B. Anthony	1820-1906
Harriet Tubman	1820?-1913
William Sherman	1820-1891
Clara Barton	1821-1912
U.S. Grant	1822-1885
Boss Tweed	1823-1878
Stephen Foster	1826-1864
Geronimo	1829-1909
James Garfield	1831-1881
Louisa May Alcott	1832-1888
James Whistler	1834-1903
Andrew Carnegie	1835-1919
Mark Twain	1835-1910
Bret Harte	1836-1902
Winslow Homer	1836-1910
J. P. Morgan	1837-1913

GROUP C

John Wilkes Boothe	1838-1865
John D. Rockefeller	1839-1937
George Armstrong Custer	1839-1876
William McKinley	1843-1901
Thomas Edison	1847-1931
Joseph Pulitzer	1847-1911
Samuel Gompers	1850-1924
John Philip Sousa	1854-1932
Woodrow Wilson	1856-1924
Booker T. Washington	1856-1915
Theodore Roosevelt	1858-1919
Goerge Washington Carver	1859-1943
John Pershing	1860-1948
Jane Addams	1860-1935

1860-1914

GROUP B

William Randolph Hearst	1863-1951
Henry Ford	1863-1947
John Jacob Astor	1864-1912
Wilbur Wright	1867-1912
William DuBois	1868-1963
Orville Wright	1871-1948
Stephen Crane	1871-1900
Herbert Hoover	1874-1964
Winston Churchill	1874-1965
Pancho Villa	1877-1923
Joseph Stalin	1879-1953
Douglas MacArthur	1880-1964
Franklin Delano Roosevelt	1882-1945
Eleanor Roosevelt	1884-1962
Eugene O'Neill	1888-1953
George Meany	1894-1980
Babe Ruth	1395-1948
J.Edgar Hoover	1895-1972
F. Scott Fitzgerald	1896-1940
Amelia Earhardt	1897-1937
Humphrey Bogart	1899-1961

GROUP B	Ernest Hemingway	1899-1961
	Clark Gable	1901-1960
	Charles Lindberg	1902-1974
	John Steinbeck	1902-1968
	Strom Thurmond	1902-
	Leonid Brezhnev	1906-1983
	Walter Reuther	1907-1970
	John Wayne	1907-1983
	Bette Davis	1908-
	Ronald Reagan	1911-
	Richard Nixon	1913-
	Jonas Salk	1914-
		1914-present
GROUP A	Ingrid Bergman	1915-1982
	John Fitzgerald Kennedy	1917-1963
	George Wallace	1919-
	John Glenn	1921-
	Jimmy Carter	1924-
	Marilyn Monroe	1926-1962
	Grace Kelly	1929-1983
	Martin Luther King	1929-1968
	Elvis Presley	1935-1977
	John Lennon	1940-1980

WORKSHEET FOR RELATIONAL ANALYSIS ACTIVITY

1. Find a name from Group A that is familiar.
2. Write that name and birth and death dates on the line provided in column I.
3. Find a familiar name in Group B whose death date approximately coincides with the birth date of the person identified in Group A. Try to find a death date that is no more than 5 years away from the birth date.
4. Repeat steps 1, 2, and 3 above for Group C, D, E, and F.
5. In Column II list one major event in the life of each of the persons in Column I. Include the date of the event.
6. In column III write the years when the people in Column I were your age.
7. In Column IV list an event which approximately coincides with the date in Column III.

	COLUMN I	COLUMN II	COLUMN III	COLUMN IV
GROUP A				
GROUP B				
GROUP C				
GROUP D				
GROUP E				
GROUP F				

TEACHER'S GUIDE TO THE RELATIONAL ANALYSIS ACTIVITY

Relational analysis is the mental process which provides the entry point to the process of analogous thinking. Analogy cannot be taught directly as a thinking skill. Rather, the teacher can only prepare the conditions which will make analogous thinking more likely of occurence. In teaching the skill of relational analysis the teacher helps the student conceptualize abstract relationships. In the activity presented here the concept time must be conceptualized in terms of relative time frames or time periods. The intent is to help the student compare time periods and personalities of the present with time periods and personalities of the past, so as to build up a sense of time past, not in terms of decades or centuries but in terms of lifetimes of people. If those relative time frames or time periods are to be meaningful they must be reflected upon in terms of the lives of historical figures the students are already familiar with. Therefore the first activity is the elimination by each student of names on the list with which he/she is unfamiliar.

Two alternative approaches are provided here, one for advanced students; the other for average students. If you have students of severely limited ability perhaps it would be advantageous to pair them off with better students for this activity.

OPTION A (advanced students)

1. Provide students with the list of names (pages 9-13) with the dates deleted.
2. Have students identify those names with which they are familiar. Require students to keep at least one name in each time grouping, but strike out unfamiliar names.
3. Have students find both the birth and death dates for the names not stricken out.
4. Hand out the worksheet (page 14) and have the students complete it.
5. Brainstorm with the students the question "should these historical figures have been able to anticipate the major events which they later shaped? Could they have anticipated these events when they were 16 years old?"
6. Brainstorm with the students what major events may be laying ahead in their lives.

OPTION B (average students)

1. Provide students with the list of names (pages 9-13) with the dates included.
2. Have students eliminate names that are unfamiliar, but require that they keep at least one name from each time grouping.
3. Hand out worksheet (page 14) and have the students complete it.
4. Brainstorm with the students the question "should these historical figures have been able to anticipate the major events they later shaped? Could they have anticipated these events when they were 16 years old?"
5. Brainstorm with the students what major events may be laying ahead in their lives.

A possible follow-up activity might involve writing a short essay about the perspective of some historical figure on his/her times when he/she was 16.